



Standard Practices for Detecting Leaks in Reverse Osmosis Devices¹

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ε¹ NOTE—An editorial change was made in 10.1 in June 2003.

1. Scope

1.1 These practices cover detecting leaks in which there is a direct communication between the feed or concentrate, or both, and the permeate. Several types of leaks are possible with the various configurations of reverse-osmosis devices.

1.2 Types of Leaks:

1.2.1 With hollow-fiber devices, feed or concentrate leakage, or both, into the permeate stream by leaks through the tube sheet and past the tube sheet O-ring are possible. “Leaks” caused by broken fibers are not covered by these practices.

1.2.2 With spiral-wound devices, leaks may occur through damage of the membrane surface itself by punctures or scratches, by glue-line failure, and by O-ring leaks on product tube interconnectors.

1.2.3 With tubular devices, leaks due to membrane damage, tube end seal leaks, and leaks from broken tubes or product headers are possible.

1.3 Three leak test practices are given as follows:

Practice A—Tube Sheet and O-Ring Leak Test for Hollow Fiber Devices	Sections 6 to 9
Practice B—Vacuum Test for Spiral Wound Devices	10 to 12
Practice C—Dye Test for Spiral Wound and Tubular Devices	13 to 18

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:

D 1129 Terminology Relating to Water²

D 1193 Specification for Reagent Water²

D 4194 Test Methods for Operating Characteristics of Reverse Osmosis Devices³

¹ These practices are under the jurisdiction of ASTM Committee D19 on Water and are the direct responsibility of Subcommittee D19.08 on Membranes and Ion Exchange Materials.

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² Annual Book of ASTM Standards, Vol 11.01.

³ Annual Book of ASTM Standards, Vol 11.02.

E 60 Practice for Molecular Absorption Spectrophotometric Methods for Chemical Analysis of Metals, Ores, and Related Materials⁴

E 275 Practice for Describing and Measuring Performance of Ultraviolet, Visible, and Near Infrared Spectrophotometers⁵

3. Terminology

3.1 For definitions of terms used in these practices, refer to Terminology D 1129.

3.2 For descriptions of terms relating to reverse osmosis, refer to Test Methods D 4194.

3.3 Definitions of Terms Specific to This Standard:

3.3.1 *leak*—bypassing of the intact membrane from the feed side to the permeate side.

4. Summary of Practice

4.1 The hollow-fiber device being tested is operated at low pressure with the permeate tube sheet exposed (the fiber bundle is held in place by a “spider” device designed for the specific model under test). Any significant leak in the tube sheet or O-ring seal is detected visually by inspection.

5. Significance and Use

5.1 These practices may be used to determine whether a reverse-osmosis device is free of leaks if the mechanical integrity of the device is to be confirmed. They may also be used to detect leaks in reverse-osmosis devices whose operating performance indicates a possible leak. These practices may be used for either new or used devices.

6. Apparatus

6.1 “Spider” Device, designed for the specific model of hollow-fiber device being tested, is available from the supplier. The “spider” is designed to take the place of the permeate end plate and permeate collection grid/block while securing the fiber bundle from movement. This allows visual observation during low-pressure operation with the fiber bundle retained in its original position.

⁴ Annual Book of ASTM Standards, Vol 03.05.

⁵ Annual Book of ASTM Standards, Vol 03.06.